

Show all work. You may leave arithmetic expressions in any form that a calculator could evaluate. By putting your name on this paper, you agree to abide by the university's code of academic integrity in completing the quiz. Use no books, calculators, cellphones, communication with others, scratchpaper, etc.

Name _____

Student number _____

For this page of the quiz, assume you have a base 2 computer that stores floating point numbers using a 5 bit normalized mantissa (x.xxxx), a 4 bit exponent, and a sign for each. Assume that all numbers are chopped rather than rounded.

1. (10) Consider the the following code fragment:

```
x = 1;
for j=1:2^(20),
    x = x + delta;
end
```

For the computer specified above, what is the largest value of **delta** for which the final value of **x** is 1? Explain your reasoning.

2. Consider the equation $x^2 - .81 = 0$.

(a) (5) What is the relative error in the values $x_1 = .85$, $x_2 = -.85$ as approximations to the two solutions to the equation?

(b) (5) Give a backward error bound for $x_1 = .91$, $x_2 = -.91$ as approximations to the two solutions to the equation.